Electronic Supplementary Material (ESI) for Lab on a Chip.

Synchrotron FTIR Mapping of Mineralization in a Microfluidic Device

Shunbo Li, Johannes Ihli, William J. Marchant, Muling Zeng, Li Chen, Katia Wehbe, Gianfelice Cinque, Oscar Cespedes, Nik Kapur and Fiona C. Meldrum

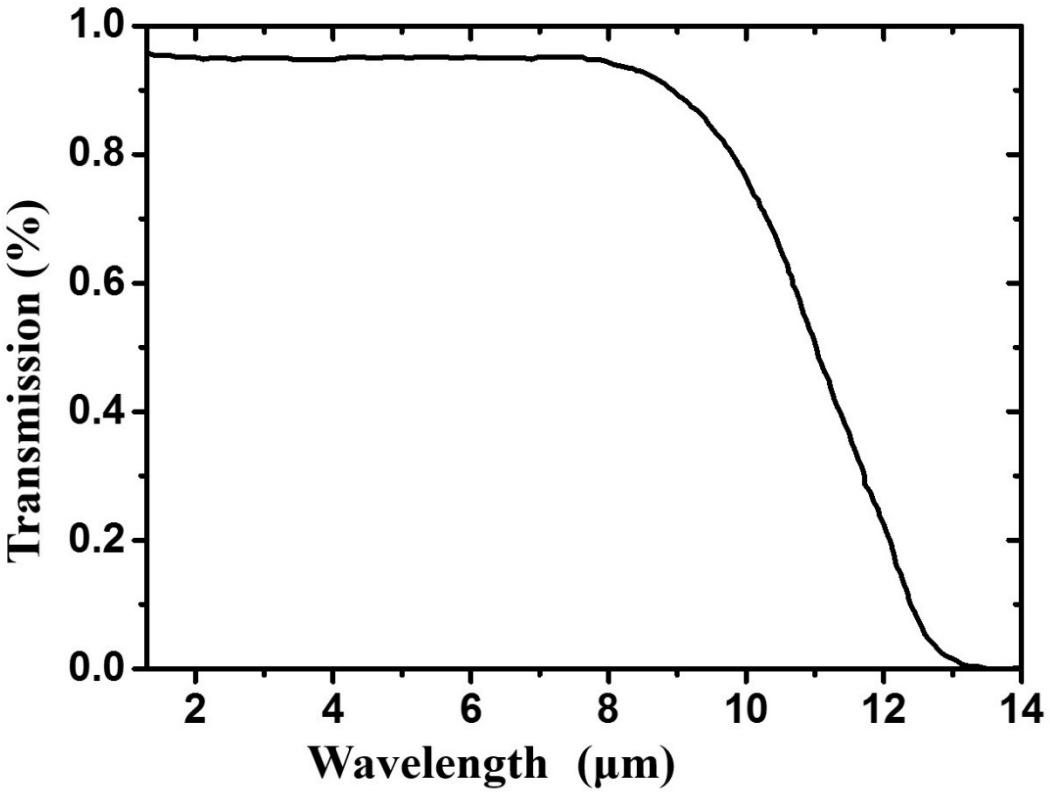

Figure S1. A transmission spectrum of 1 mm calcium fluoride crystal provided by Crystran.

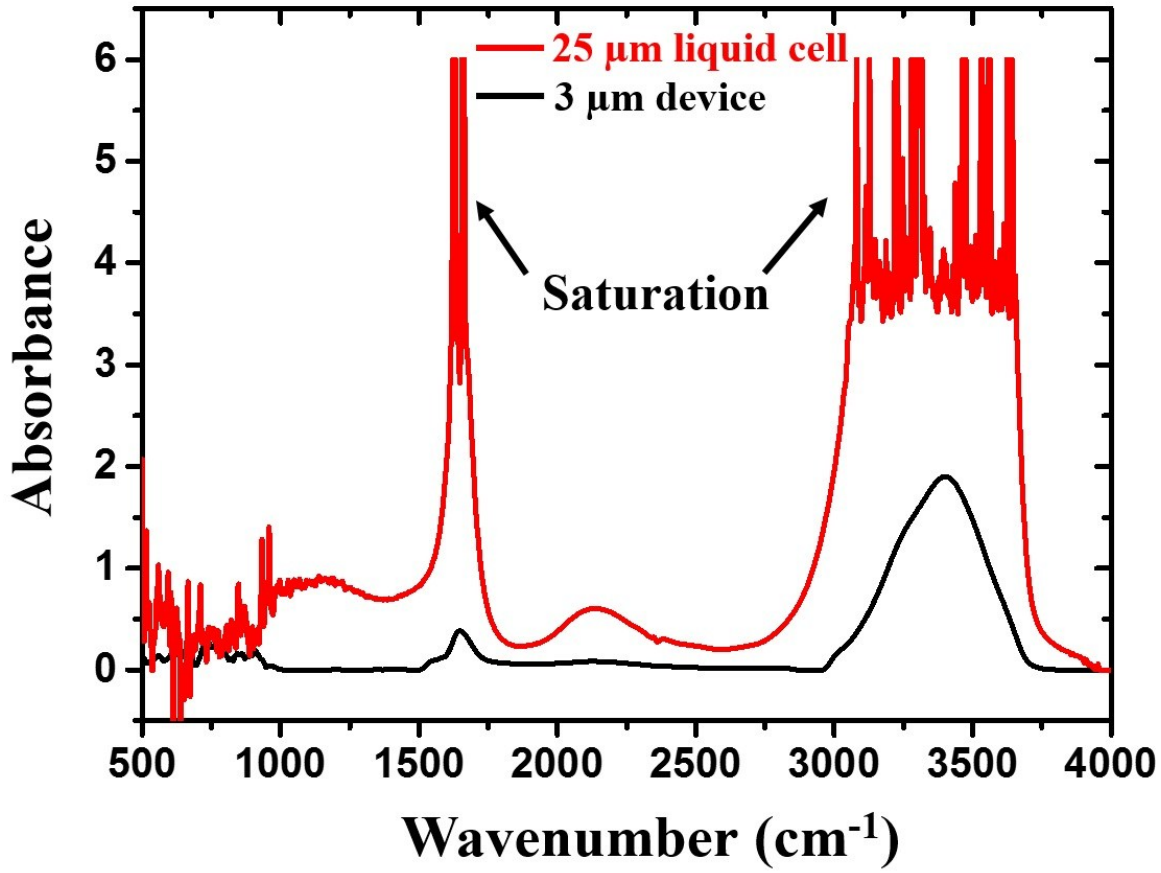

Figure S2. The absorption coefficient of water for in a 25 µm liquid cell (red) and the microfluidic device with 3 µm channel height (black). Saturation is seen around 1600 and 3400 cm^{-1}. The height of the liquid cell was determined using a Teflon spacer.

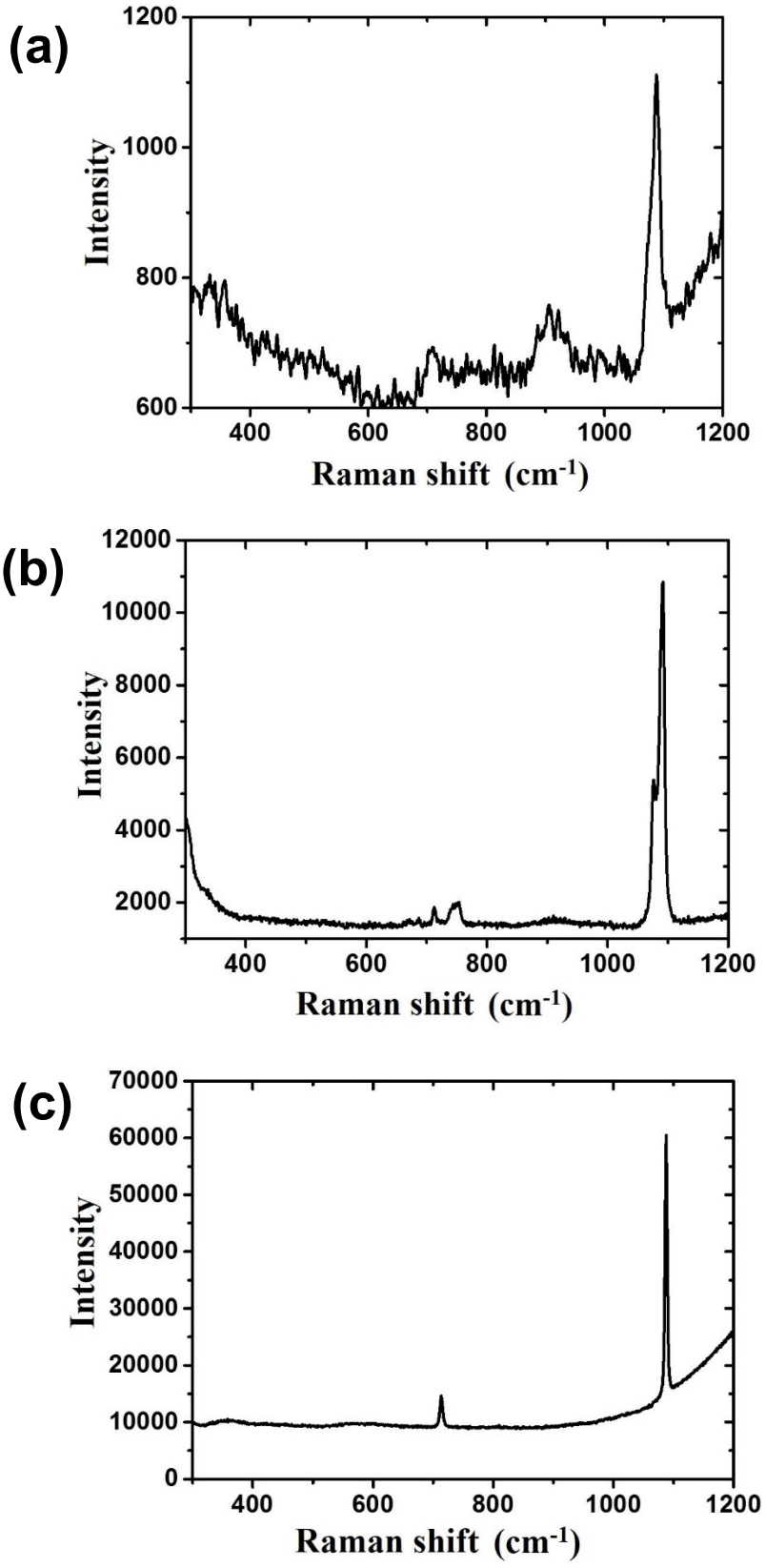

Figure S3. Raman spectra of (a) amorphous calcium carbonate (ACC), (b) vaterite and (c) calcite prepared in bulk solution.

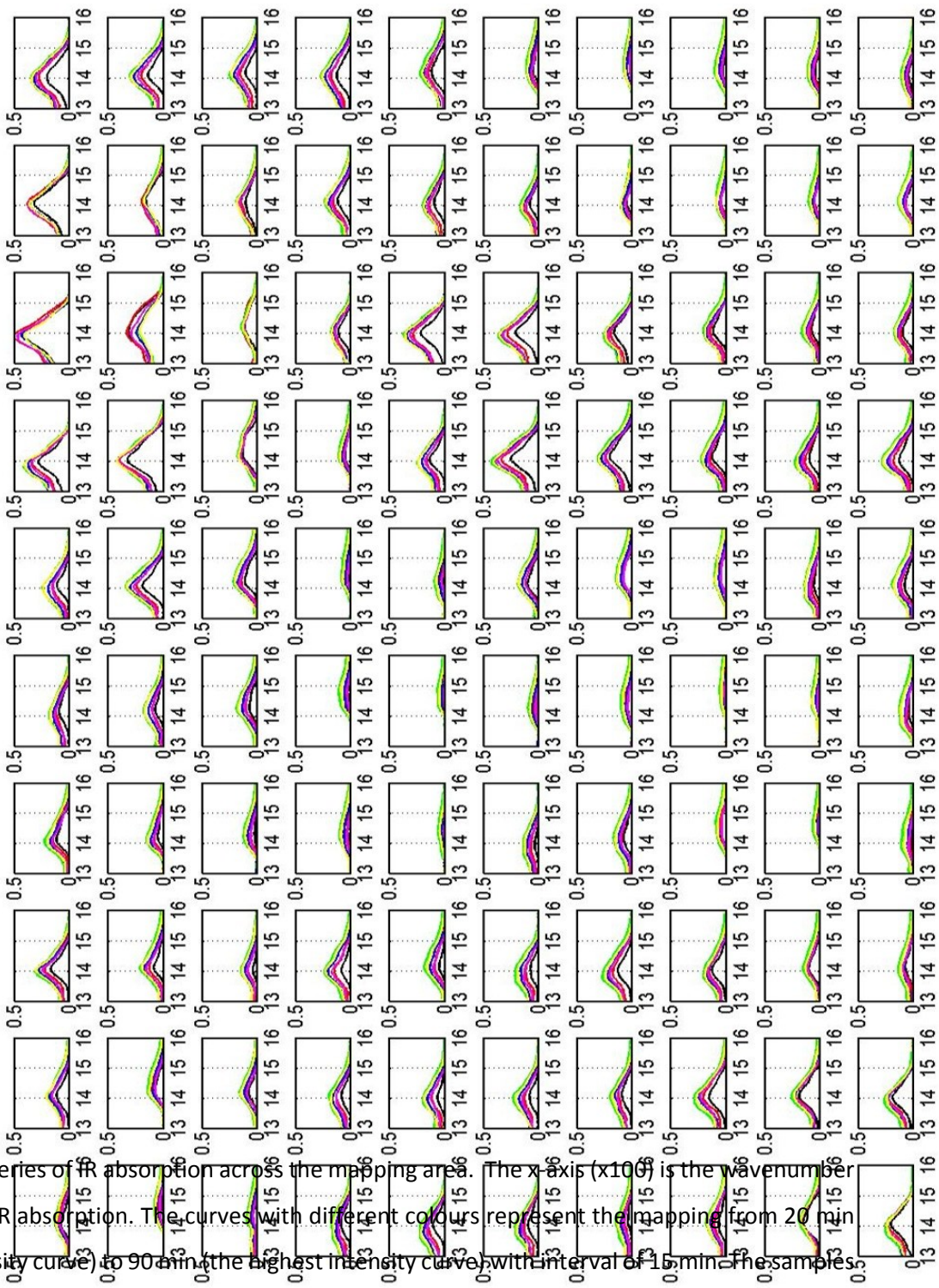

Figure S4. Time series of IR absorption across the mapping area. The x-axis (x100) is the wavenumber and y-axis is the IR absorption. The curves with different colours represent the mapping from 20 min (the lowest intensity curve) to 90 min (the highest intensity curve) with interval of 15 min. The samples were prepared by mixing equal volumes (100 µL) of 500 mM $CaCl_2$ and Na_2CO_3 solutions, diluting this suspension with 200 µL DI water and then injecting into microfluidic chip by syringe.

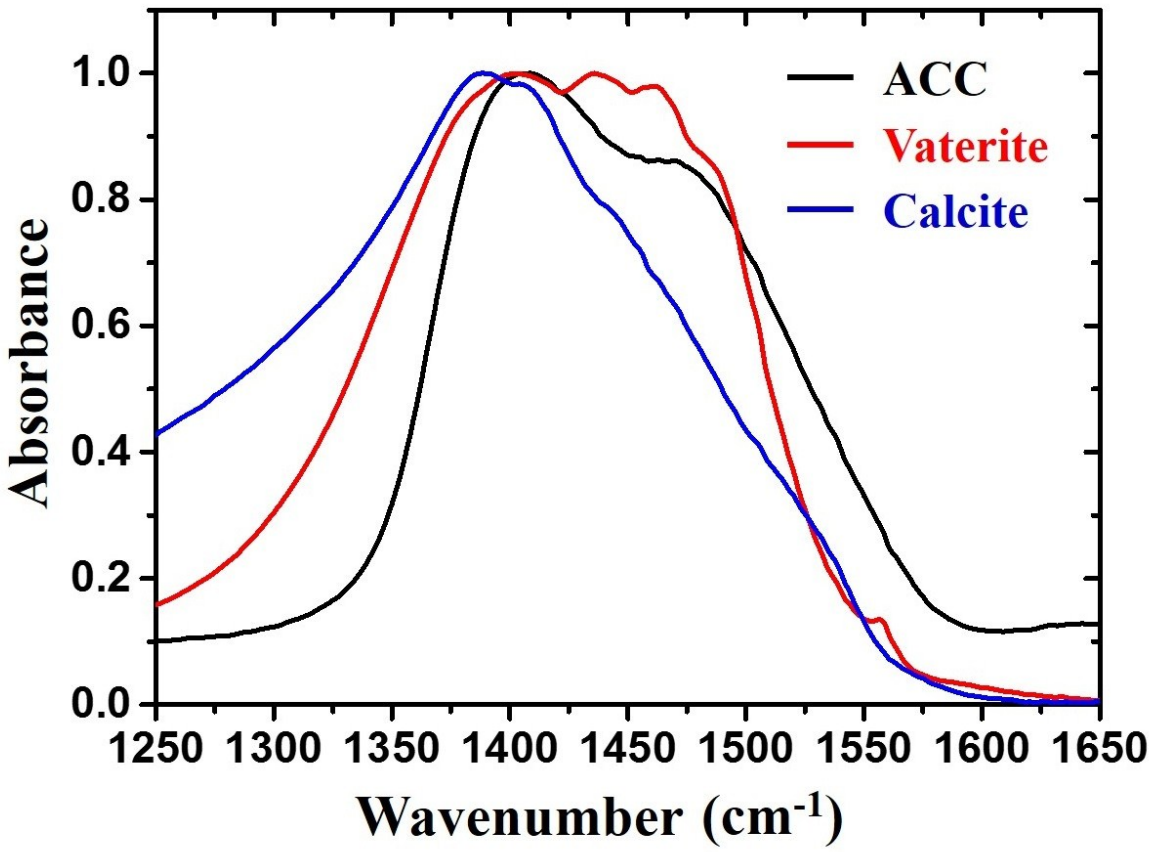

Figure S5. IR spectra of dry powders of ACC, vaterite and calcite. ACC has a peak at 1404 cm^{-1}, vaterite has a broad peak at 1395-1471 cm^{-1} and calcite has a peak at 1392 cm^{-1}.

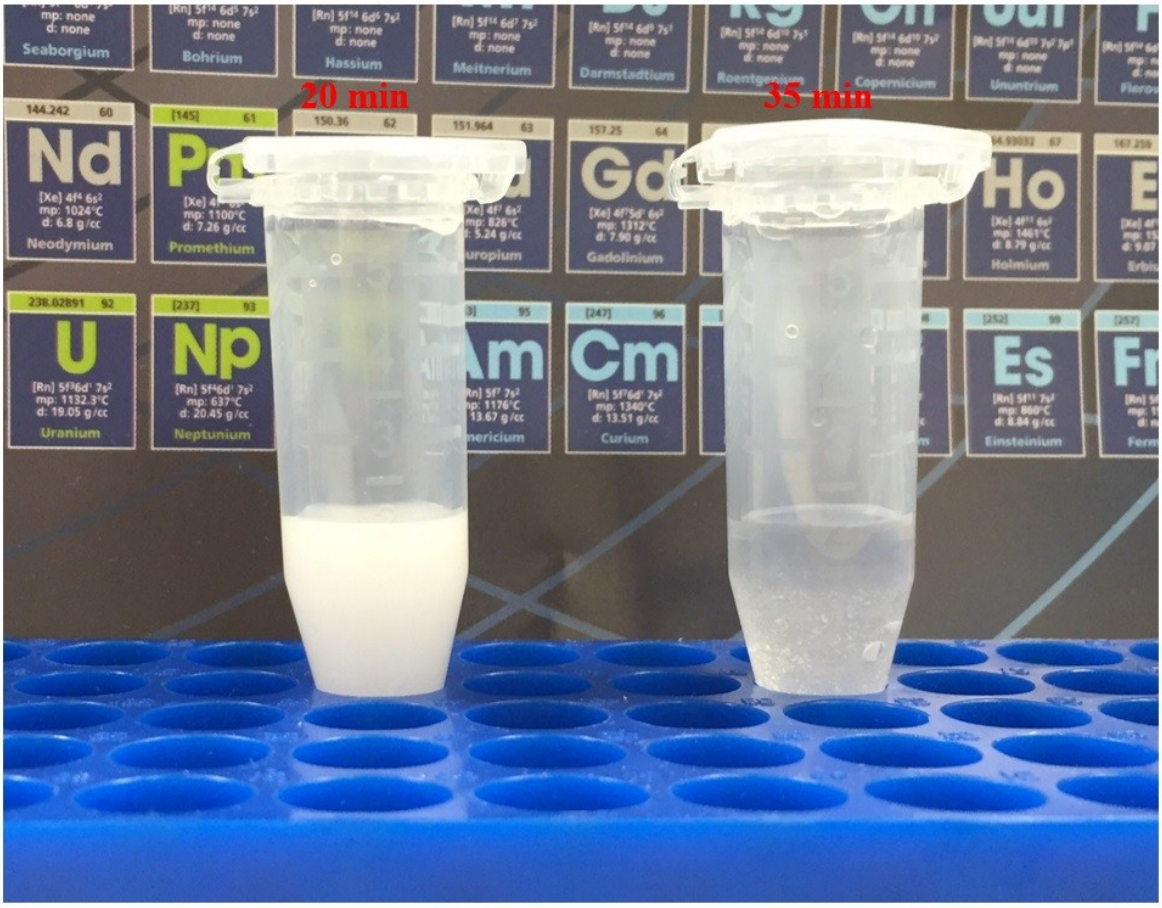

Figure S6. Optical image of $CaCO_3$ precipitates formed in vials after 20 min and 35 min by mixing equal volumes (500 µL) of 500 mM solutions of $CaCl_2$ and Na_2CO_3. 1 mL DI water was added after mixing to give the same conditions as in the microfluidic chip.

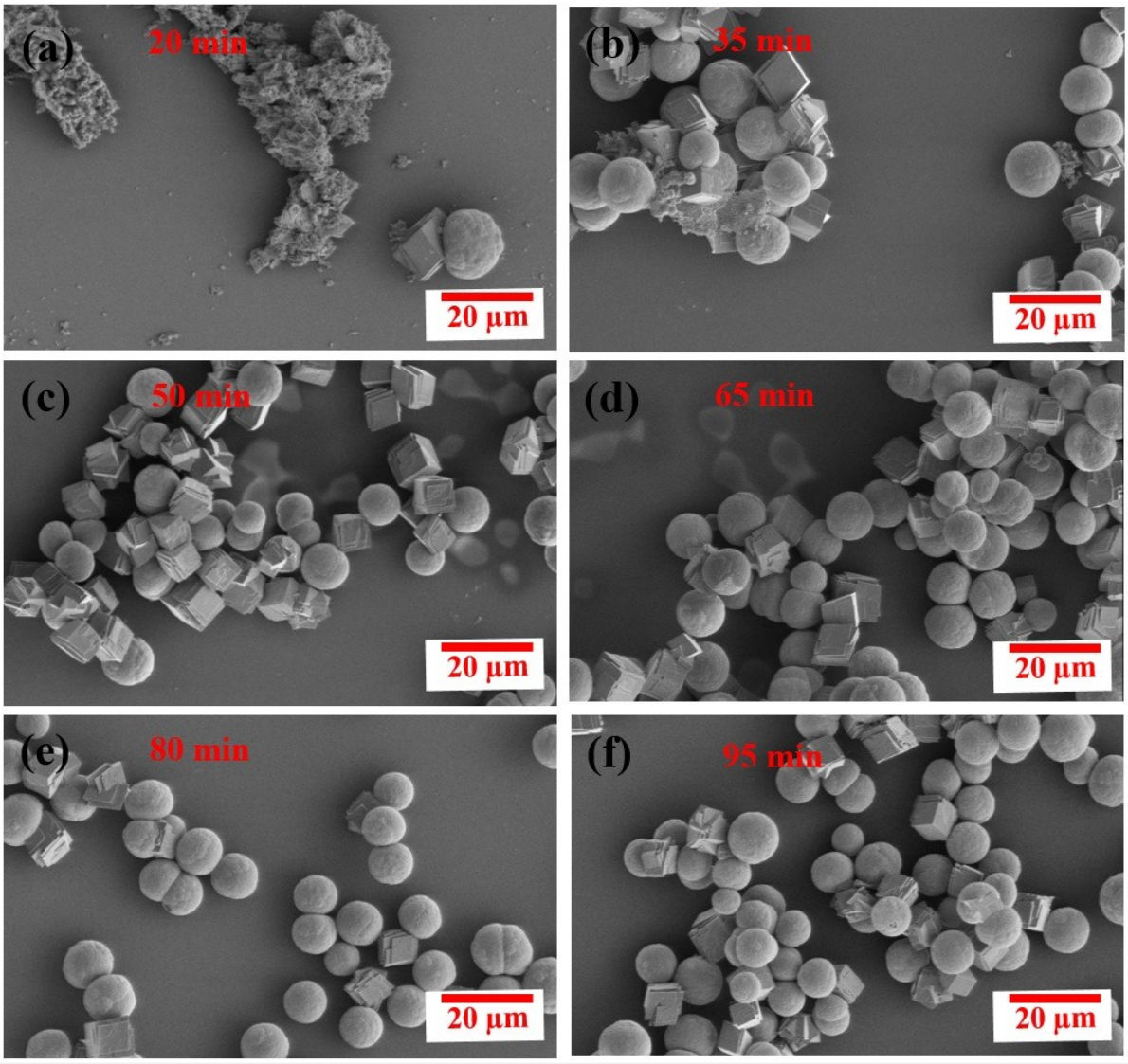

Figure S7. SEM images of $CaCO_3$ particles formed on combination of equal volumes of 500 mM $CaCl_2$ and Na_2CO_3 solutions in bulk at different times.